DIVISION 16 - ELECTRICAL

SECTION 16011

GENERAL SPECIFICATIONS, ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE

This section of the specifications shall govern all phases of the electrical work at the pump station.

1.2 DRAWINGS

The drawings show the general arrangement of all conduits, equipment, and appurtenances etc. and shall be followed as closely as actual building construction and the work of other trades will permit. Because of the small scale of the drawings, it is not feasible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the construction conditions affecting the work and provide fittings and accessories as required to meet actual conditions.

1.3 VISITING THE SITE

Each Contractor shall visit the site to familiarize himself with all conditions to be met in the execution of the work under this contract. No additional compensation will be allowed for any changes he may be required to make because of these conditions.

1.4 MATERIALS AND WORKMANSHIP

Equipment and material used in the project shall be new and undamaged. The Mechanical installation shall fit into the space allotted and shall allow adequate, acceptable, clearances for entry, servicing and maintenance. Similar types of equipment shall be products of the same manufacturer unless specified otherwise. Work shall be performed by mechanics or tradesmen skilled in the trade involved.

1.5 PERMITS, LICENSES, TAXES AND INSPECTION CERTIFICATES

All permits, bonds, licenses, inspection fees and taxes required for the execution of the work shall be obtained and paid for by the Contractor. Under each phase of the work, the Contractor shall furnish three copies of certificates of final inspection to the Engineer from any inspection authority having jurisdiction. The Contractor shall construct his installation in accordance with their requirements.

1.6 EXCAVATION AND BACKFILLING

Refer to Division 2 Specifications. Except as otherwise specified in Division 2, the following shall apply to the electrical work.

A. General: Each Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths required for installation of his work. All excavated materials not required or suitable for backfill shall be removed and wasted as indicated on the drawings or as directed by the Engineer. Shoring shall be provided as necessary to protect existing facilities, new work and the safety of personnel. Excavation shall be by open cut except that short sections of a trench may be tunneled if the conduit can be properly installed.

B. Trench Excavation: Trenches shall be of necessary width for the proper laying of the cable or conduit, and the banks shall be as nearly vertical as practicable. Trench width at top of the able or conduit shall be not more than 8" on either side. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each length. Except where rock is encountered, care shall be taken not to excavate below the depths required. Rock shall be excavated to a minimum overdepth of 6 inches below the trench depths required. All trench overdepths shall be backfilled with sand, or loose, granular, moist earth and thoroughly tamped. Unstable soil that is incapable of properly supporting the conduit shall be removed to the depth required and the trench treated as overdepth.

C. Protection of Existing Utilities: Existing utility lines to be retained, whether known or unknown and uncovered during excavation operations, shall be protected from damage during excavation and backfilling, and if damaged, shall be restored to original condition.

D. Backfilling: Do not backfill until all tests have been performed and the utility systems installed conform to the requirements of the Contract Documents. Trenches shall be carefully backfilled with clean earth, sand and gravel, soft shale or other approved materials, free from clods of earth or stones over 2" dimension, deposited in 6 inch layers and thoroughly tamped until the cable or conduit has a cover of not less than one foot. The remainder of the backfill shall be placed in the trench in one (1) foot layers and tamped. Settling the backfill with water will be permitted. The surface shall be graded to reasonable uniformity and mounded over trenches. Compacted backfill shall be used for all excavation under slabs on grade, building structures, concrete or asphaltic paving, and driveway or parking areas. Compacted backfill shall be in accordance with the requirements of compacted backfill for the general construction specifications and test shall also be made per the specification.

1.7 EQUIPMENT SUBMITTAL DATA

A. Submission of Data: Copies of shop drawings, catalog data sheets or such other data necessary to fully describe and substantiate compliance with the specifications shall be submitted for all equipment and materials in accordance with the General Conditions. The Contractor shall submit a complete list of equipment to be furnished, giving Manufacturer's name and catalog number for each item. Intent to furnish the exact make named for any item does not relieve the Contractor of this responsibility. If a submittal of this list is not made, the Engineer reserves the right to make a full selection of equipment, which shall be final and binding, and shall be furnished without additional cost to the Owner. Submittal data for all related equipment shall be submitted at one time.

1.8 COORDINATION OF WORK

A. General: The Contract Documents indicate the extent and general arrangement of the systems. The Contractor shall be responsible for the coordination and proper relation of the work of all trades to the building structure and to the work of other trades. No additional compensation nor extension of completion time will be granted for extra work caused by the lack of coordination.

B. Cooperation: The Contractor shall provide dimensions and locations of all openings and similar items to the proper trades and install work as required so as not to interfere with, or delays, the construction.

C. Locations: Locations of lines and equipment shall be determined for actual field measurements. The outlines of the construction shown on the drawings are intended only as a guide to indicate relative locations of the work. If conflicts prevent installations of the work at the locations indicated, minor deviations shall be made subject to acceptance by the Engineer, and without additional compensation.

D. Cutting and Patching: Unless stated otherwise, the Contractor shall do all cutting necessary for the installation of his work. All work should be installed sufficiently in advance of new construction in order to permit installation of supports, sleeves and similar items without cutting. Cutting which will in any way affect the structure shall not be performed without permission of the Engineer. The Contractor is responsible for patching where he does cutting. Patching shall be done to the satisfaction of the Engineer.

E. Roughing-In: All rough-ins which include the following (but not limited to) receptacles, thermostats, and other similar items shall align vertically or

horizontally with each other, the structure and other features thereof when it appears obvious and logical that they should. Each Subcontractor shall consult with the Superintendent regarding this requirement and also for location of other machines, door swings, block coursing, alignment of this and other similar features before roughing-in for these components.

1.9 DATA FOR OWNER

The Contractor shall provide copies of operating and maintenance instructions for each item of equipment in accordance with the General Conditions.

1.10 INSPECTION REPORTS

Each item of discrepancies noted on final inspection reports prepared by the Engineer shall be answered in detail in writing by the Contractor before final acceptance of the systems can be recommended.

1.11 SLEEVES AND INSERTS

A. General. The Contractor shall provide sleeves and inserts, correctly located in the structures, as required for his work.

B. Inserts: Inserts shall be steel and of proper size for loads encountered.

C. Sleeves: Sleeves shall be provided for all conduits passing through concrete or masonry walls, partitions, or concrete slabs. Install during construction to avoid later cutting. Sleeves placed horizontally in walls shall be standard weight ASTM A53 steel pipe of length equal to thickness of wall. Those placed vertically in non-waterproof floors shall be 20 gauge galvanized sheet of length equal to thickness of slab, flared and nailed to the form, or fastened to reinforcing fabric and filled with sand during pouring to prevent deformation. Sleeves occurring in floors, equipment rooms, other similar rooms where hose bibs or floor drains occur, and in pipe areas, shall be standard weight steel pipe projecting 1/2" above the finished floor. Sleeves in floors with waterproof membrane shall be provided with flanges or flashing rings and shall be clamped or flashed into the membrane. All sleeves shall be of sufficient diameter to clear bare or covered conduits by 1/4" all around except sleeves on lines subject to movement by expansion shall clear the bare pipe or insulation on insulated pipe at least one inch all around. Conduits through exterior walls in spaces below grade shall have modular mechanical type seals consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the conduit and wall sleeve. Sleeve shall have anchor and waterstop plate. The entire assembly shall be tightened and adjusted to make watertight. Conduits through fire partitions, walls or floor shall be sleeved with approved fire penetration assemblies.

D. Seals: Wires or cables installed in conduits penetrating exterior walls in underground structures shall be sealed watertight at the cabinet or other point of termination with an expandable rubber cable sealing bushing such as O.Z. Gedney Style CSB. This is to prevent water entering the cabinet or other termination from inside the conduit.

1.12 EQUIPMENT INSTALLATION

A. General. Equipment shall be installed, in accordance with manufacturers instructions to conform with the details and application indicated.

B. Supports. Provide necessary supports for all equipment and appurtenances as required; this includes but is not limited to frames or supports for items such as transformers, lights, electrical panels and other similar items requiring supports.

C. Temporary Requirements. Openings in equipment shall be kept plugged at all times until connection is made to the system. The ends of all conduits shall be kept plugged or capped properly with approved devices. Approved devices are items such as specially molded plastic caps, pipe plugs, and sheet metal caps.

1.13 ELECTRICAL WIRING AND EQUIPMENT

A. Motors. Motors required to drive equipment specified in the Specifications shall be provided in place by the Contractor furnishing the driven equipment, ready for electrical connections. Motors shall be in accordance with NEMA Standards and of design suitable for the starting and running characteristics of the driven equipment. Unless specified otherwise, motors shall have continuous duty classification, 40E Centigrade rise based on 40E Centigrade ambient temperature, shall have general purpose enclosure and shall be wound for 120 volt, single phase, 60 cycle current, except motors 1/2 horsepower and above shall be wound for 208 V or 230 V/460V as required by the secondary voltage specified for main service in the ELECTRICAL SPECIFICATIONS. Each motor shall be selected and rated at the voltage indicated so that the driven load does not exceed the nameplate service factor of the motor.

B. Motor Starters. Motor starters shall be provided under the ELECTRICAL SPECIFICATIONS except where specified to be furnished specifically with the driven equipment. Motor starters shall be as specified under the ELECTRICAL SPECIFICATIONS. Accessories such as auxiliary contacts, hand-off automatic switches, start-stop switches, pilot lights, control power transformers and other similar items shall be provided in starting equipment or on the controllers as required by the control sequence, unless factory mounted on the equipment, shall be installed under the ELECTRICAL SPECIFICATIONS.

C. Wiring shall be accomplished under the ELECTRICAL SPECIFICATIONS and shall be in accordance with manufacturer's recommendations to comply with the sequence of control indicated. Mechanical contractors shall verify that wiring of all motors and controls required by driven equipment furnished is accomplished to provide the correct sequence of operation. Low voltage control wiring and communications wiring shall be provided under the ELECTRICAL SPECIFICATIONS unless indicated to be under other sections.

D. Disconnects and Motor Protective Switches. Disconnects and motor protective switches shall be provided for each item of equipment under the ELECTRICAL SPECIFICATIONS unless specified otherwise in other sections.

E. Miscellaneous. Miscellaneous manual or automatic control and protective or signal devices required for the sequence of operation indicated shall be provided under the section of the specifications where the driven equipment is specified unless indicated otherwise.

F. If not otherwise indicated provide individual disconnecting and overcurrent means (circuit breaker or motor circuit protector) for all three phase motors and equipment

1.14 RECORD OF UNDERGROUND LINES

A. On completion of the project, the Contractor shall prepare and submit to the Engineer a drawing on tracing paper and one blue print to show the location of any underground lines installed. The distance from the buildings to outside conduits, pipes, and cable shall be dimensioned. This is in addition to the requirements for "Record Documents" specified elsewhere.

1.15 MARKING AND DESIGNATION OF EQUIPMENT

A. Properly mark operating and control parts of the equipment systems such as disconnect switches, motor starters, and control devices.

B. Starters, disconnect switches and control instruments shall have black and white laminated engraved plastic nameplates. All electrical items shall be labeled by the electrical contractor even though the item may have been furnished by another subcontractor. Identification symbols or designations shall be the same as shown on the Contract Documents.

1.16 GUARANTEE

A. Electrical equipment, materials and labor required by these specifications and accompanying drawings shall be guaranteed to be free from defective materials or workmanship for a period of one year after final acceptance of the project. Defects in material or workmanship occurring during this period shall be corrected with new material and equipment or additional labor at no cost to the Owner in accordance with the General Conditions.

1.17 PAINTING

A. Concealed Areas: All metal surfaces not otherwise protected in concealed spaces shall be painted with one thorough coat of epoxy paint in accordance with Section 09900. Copper, aluminum, stainless steel and galvanized material shall not be painted except where galvanized finish has been damaged.

B. Finished Areas: All equipment and material in other areas will be painted under PAINTING AND PROTECTIVE COATING Section 09900 of these Specifications.

C. Preparation: All surfaces shall be thoroughly cleaned before the paint is applied, and the painting shall not be done until the paint has been thoroughly tested out and otherwise completed, and not until the building operations have progressed to a point where the painted surfaces will not be defaced by the completion of the building. Before applying paint to any galvanized surface, the surface shall be cleaned in accordance with the paint manufacturer's written recommendations.

D. Responsibility: Each Contractor shall be responsible for painting all work installed by him as required above.

1.18 INSTRUCTION OF OWNER'S REPRESENTATIVE

A. In accordance with the general conditions, the Contractor shall instruct the representative of the Owner in the proper operation and maintenance of all elements of the electrical systems. Competent representatives of the Contractor shall spend not less than one eight hour day in such formal instruction and shall spend such additional time as necessary to fully prepare the Owner to operate and maintain the electrical systems.

END OF SECTION